

THURSDAY, MAY 27, 1880

MATHEMATICAL JOURNALS

American Journal of Mathematics, Pure and Applied.
Published under the auspices of the Johns Hopkins University. Vols. i., ii. (Baltimore: John Murphy and Co.)

THE *American Journal of Mathematics* has now completed its second volume, and has obtained an established place among the leading mathematical journals. Thanks to the Johns Hopkins University at Baltimore, America possesses, what has never been attempted in England, a *quarto* journal entirely devoted to mathematics.

Perhaps in no branch of science is the literature of the subject so exclusively confined to periodical publications as in mathematics. The books that are written are merely text-books and, in this country, generally have reference to certain special examinations. Of course there are exceptions which will immediately occur to mathematicians, such as Salmon's treatises and Todhunter's histories, and the exceptions are more numerous in Germany; but, even when all the books published in all languages which are above the rank of school-books are included, they bear an extremely insignificant proportion to the amount of original mathematical literature contained in periodical publications; in fact it would be impossible to form any idea of the present state and extent of mathematical science from any study of the books upon the subject. The same is to some extent true of all branches of science; but the want of treatises is greatest in mathematics on account of the smallness of the audience addressed and the impossibility of expressing even the results in a manner intelligible to the non-mathematical reader.

As a consequence of the scarcity of treatises there are many extensive branches of mathematics (such as, for example, the Partition of Numbers) which exist only in the periodicals; and the contents of the latter are therefore less transitory, so to speak, than in other sciences, *i.e.*, the papers are less liable to be superseded by subsequent writings and to become only of historical interest.

A journal devoted to a special subject always promotes activity in that subject, as one paper gives rise to another; but, besides this, it collects in one place many researches which would otherwise be widely scattered in the publications of different societies; and this latter advantage is much more apparent when, as in the case of the *American Journal*, its extent is sufficient to enable it to receive elaborate memoirs. Thus M. Lucas' "Théorie des Fonctions simplement périodiques" occupies 90 pages, and Mr. McClintock's "Essay on the Calculus of Enlargement" 61 pages. There is no reason to suppose that the majority of the papers contained in the *American Journal* would not have been written and printed, if the latter had not existed, but it is a real gain to the mathematician to have them all united in a single periodical.

The great increase in the number of mathematical journals in the last few years is very remarkable. The following is, we believe, a complete list of all the journals now in existence which are exclusively devoted to mathe-

matics, with place of publication and date of foundation. An asterisk denotes that the journal to which it is prefixed admits problems for solution:—

AMERICA

**Analyst* [Des Moines, 1874], 8vo.
American Journal [Baltimore, 1878], 4to.

ENGLAND

Quarterly Journal [Cambridge, 1839], 8vo.
Messenger [Cambridge, 1862], 8vo.

FRANCE

Journal (Liouville) ... [Paris, 1836], 4to.
**Nouvelles Annales* ... [Paris, 1842], 8vo.
Bulletin [Paris, 1870], 8vo.

GERMANY

Journal (Crelle) [Berlin, 1826], 4to.
Archiv (Grunert) [Greifswald, 1841], 8vo.
Zeitschrift (Schlömilch) ... [Leipzig, 1856], 8vo.
Annalen (Clebsch) [Leipzig, 1869], 8vo.
Fortschritte [Berlin, 1871], 8vo.
Repertorium [Leipzig, 1877], 8vo.

ITALY

Annali (Tortolini) ... [Rome, 1850], 4to.
Giornale (Battaglini) ... [Naples, 1863], 8vo.
Bulletino (Boncompagni). [Rome, 1868], 4to.

BELGIUM

**Nouvelle Correspondance*. [Mons, 1874], 8vo.

HOLLAND

Nieuw Archief [Amsterdam, 1878], 8vo.

DENMARK

**Tidsskrift* [Copenhagen, 1859], 8vo.

To these may be added the **Reprint* [London, 1864] from the *Educational Times*, consisting almost entirely of problems and solutions; and also, although not strictly journals, the *Proceedings* of the London Mathematical Society [London, 1865] and the *Bulletin* of the French Mathematical Society [Paris, 1872]. The object of two of the journals, the *Fortschritte* and the *Repertorium*, is to give *résumés* of papers published elsewhere. It may be observed that all the journals included in the above list are strictly mathematical, although in the titles of some of them mathematics is coupled with physics or astronomy. A few minor periodicals, appearing at long intervals, have been omitted.

Thus of the nineteen journals included in the above list no less than seven have been founded in the last ten years, while four were founded in the preceding decade, 1860-70, so that only eight date from farther back than 1860. The oldest and by far the most celebrated journal is *Crelle*, which has now reached its eighty-ninth volume; many of the most important mathematical discoveries of the present century are contained in its pages.

The publication of problems and solutions in a mathematical journal is always to be regretted, as it is impossible not to feel that the space might be better occupied, and that the presence of mere exercises in a periodical which should be devoted to the advance of the science is undesirable. Their insertion in several cases is doubtless due to a wish to increase the number of readers by including a class who would take but little interest in, or be unable to follow, original mathematical researches; but the "problem for solution" may even be defended on scientific grounds, as it is a well-known historical fact that not a few of the greatest mathematicians were first led

to take a strong interest in mathematics by being tempted in their younger days to attack such questions. It may be remarked also that the mathematical problem has itself undergone great improvement since the days of the *Ladies' Diary*, when the problems usually appeared by the side of the enigmas, charades, &c. These problems were generally merely made-up exercises or puzzles—such as are to be found now only in examination papers—in which the data were wholly fictitious or even ridiculous; the modern problem, especially in pure mathematics, is often a theorem, or a particular case of a theorem, of very considerable intrinsic interest. It is right to mention that the *Nouvelles Annales* is really intended mainly for purposes of instruction, and that apparently a Continental student derives from this publication very much the same kind of practice and skill in the treatment of problems which at Cambridge he would obtain from his private tutor.

The history of mathematical journalism in all countries seems very similar: first, there is the Annual or other periodical, containing at the end puzzles, problems for solution, &c., the best solutions and the names of those who sent in correct solutions being given in the following number; at length these are supplemented by short articles on particular subjects—frequently suggested by the problems—by the leading contributors. The next step is the mathematical journal, consisting of two parts, the one containing original papers, and the other—quite distinct—containing a limited number of problems and solutions. Finally we have the strictly scientific journal, differing in no essential respect from the *Transactions* of a society; and, it is scarcely necessary to remark that, on account of the length of many of the formulæ, a quarto journal is preferable to one of octavo size.

From an interesting account of American mathematical periodicals by Mr. David S. Hart, which was published in the *Analyst* for September, 1875, it appears that the first mathematical journal published in America was the *Mathematical Correspondent*, which was issued at New York on May 1, 1804, and of which eight quarterly numbers only were published. The next periodical was the *Analyst, or Mathematical Museum*, of which the first number was published in 1808; five numbers only appeared. In January, 1825, the first number was issued of the *Mathematical Diary*, which continued till March, 1832; for the first two years it was published quarterly, and for the remaining five years annually, thirteen numbers in all being issued; this journal, Mr. Hart remarks, "contained besides solutions of problems many important and valuable essays on the various branches of exact science, and was the best mathematical serial that had as yet appeared." The next periodical was the *Mathematical Miscellany*, which lasted from 1836 to 1839; it had a junior and senior department, the former for young students and the latter for mathematicians; eight numbers were issued. In 1842 the first number appeared of the *Cambridge Miscellany of Mathematics, Physics, and Astronomy*, edited by Professors Benjamin Peirce and Joseph Lovering, but only four quarterly numbers were issued.

In October, 1858, Mr. J. D. Runkle published the first number of the *Mathematical Monthly*, which is by far the best known of the journals which appeared previously to

those now in existence; it contained papers not exceeding eight pages in length, notes and queries, and five problems in each number intended for students, with solutions in a subsequent number. This journal, which seemed to be filling a want, unfortunately had to be discontinued in 1861 in consequence of the war. No further attempt was made to establish a mathematical journal till January, 1874, when Dr. J. E. Hendricks established the *Analyst*, which for the first year was issued monthly and has since appeared bi-monthly. This journal, in spite of many serious disadvantages due to difficulties of printing, &c., has done good service to mathematics in America. It is not to be compared to the *American Journal* as regards the importance of its papers, and a considerable portion of each number is devoted to problems; but the editor may fairly claim to have done for the encouragement of the science not less than have the editors of the *Journal*, to which the *Analyst* may now be regarded as a valuable supplement.

Soon after the foundation of the Johns Hopkins University, the *American Journal* was issued (in 1878) under its auspices, with Prof. Sylvester as chief editor and Mr. W. E. Story as acting editor, assisted by Professors Benjamin Peirce, Simon Newcomb, and H. A. Rowland. The contents of the journal have been worthy of the reputation of the editors, and as regards printing, &c., there is nothing to be desired. Among the papers may be noticed, besides the numerous and important investigations of Prof. Sylvester himself, those by Mr. G. W. Hill on the lunar theory, by Mr. G. B. Halstead on the bibliography of hyperspace and non-Euclidean geometry, and by Mr. Story on the elastic potential of a crystal. There are also contributions from Prof. Newcomb, Prof. W. W. Johnson, Mr. C. S. Peirce, &c., and from European mathematicians, Professors Cayley, Clifford, Lipschitz, &c.

It will be generally admitted that Prof. Sylvester's researches are amongst the most valuable contained in the *Journal*; one of the most elaborate of these, which occupies 60 pages, relates to an application of the new atomic theory to the graphical representation of the invariants and covariants of binary quantics. Most of the others also have reference to invariants or covariants or cognate branches of the modern higher algebra, and the great amount of space devoted to this important subject is very noticeable. There is a paper by Prof. Cayley on the calculation of the minimum numerical generating function of the binary seventhic, and Prof. Sylvester is now publishing his valuable tables of the generating functions and groundforms for binary quantics and systems of binary quantics, which he has calculated with the assistance of his pupil, Mr. F. Franklin.

There are other well-known American mathematicians, Asaph Hall, Artemas Martin, E. B. Seitz, C. H. Kummell, &c., who do not as yet appear to have contributed to the *Journal*, although their names are familiar to readers of the *Analyst*, and when these are added to the already considerable number of American authors of papers in the *Journal*, it is clear that the mathematicians in America are sufficiently numerous to support permanently such a journal as that over which Prof. Sylvester presides. The *American Journal* has started well, and there is no reason to suppose that it has not as great a

future before it as awaited *Crelle's Journal* half a century ago.

The only method of "endowing the research" of the pure mathematician is to give him a journal, and this the Johns Hopkins University has done for America. Two years ago it seemed a question whether it was worth while to apply to the Cambridge Commissioners to endow mathematics in a similar manner in England. On the whole it seemed better not to make such an application, as the obvious difficulties in the way of the editorship, &c., of a subsidised journal would be considerable, and the existing journals, which support themselves, seem to fairly meet the demand. But for the foundation of the London Mathematical Society in 1865 the want of a large mathematical journal would have become pressing; as it is, the *Proceedings* of this Society may now be regarded as taking the place of a leading English journal. The journal, however, has two important advantages over the publications of a society: (1) the printing of the papers is unaccompanied by the formalities of reading, being reported on by referees, &c.; (2) the journal is much the more procurable, especially if separate numbers be required; it also affords more rapid publication.

J. W. L. GLAISHER

OUR BOOK SHELF

Six Life Studies of Famous Women. By M. Betham Edwards. (London: Griffith and Farran, 1880.)

THIS is a readable and instructive collection of studies, containing, among others, notices of two women notable in their different ways in the history of science—Caroline Herschel and Alexandrine Tinné, the famous African explorer. The studies are marked by care and neatness, and are on the whole fair estimates of the work and life of the subjects. They are accompanied by six well-executed steel portraits.

LETTERS TO THE EDITOR

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.*]

[*The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to ensure the appearance even of communications containing interesting and novel facts.*]

Lord Rosse's Telescope.

IN an article in the *Times* newspaper there occurs the passage—"With regard to the mighty mirror of the Parsons-town reflector M. Struve has spoken in no very complimentary terms. It was said of Sir W. Herschel's four-feet reflector that it 'bunched a star into a cocked hat;' but even this is scarcely less satisfactory than M. Struve's remark that at Parsonstown 'they showed me something which they said was Saturn, and I believed them.'" This revival of the statement attributed by Mr. Proctor in *Frazer's Magazine* for December, 1869, to "a distinguishing (*sic*) astronomer," has called forth the appended letter from the Imperial Astronomer of Russia. It is satisfactory to receive direct from M. Struve a statement of his experience of the performance of the six-foot instrument.

Rosse

25, Chesham Place, S.W., May 26, 1880.

"MY DEAR LORD ROSSE.—Yesterday evening a friend conveyed to me a note, inserted in the *Times* of April 3, under the title 'Three Giant Telescopes,' in which I am told of having expressed myself in a very uncourteous manner on the optical qualities of the great reflector constructed by your late father. I beg leave to say that those expressions are altogether invented

by the anonymous author of the note, or, at least, quite a voluntary and thoroughly wrong interpretation of what I may have said. I am sorry my name is abused in such a manner by people who probably have a design of their own in depreciating the performances of the instrument, the construction of which marked in itself a high progress in optics and mechanics, and which in its space-penetrating power has not had any rival until now, though certainly with regard to definition (particular when the mirror is considerably out of horizontal position) there are other instruments superior to it.

"OTTO STRUVE
"Pulkova, April 14"

Brain Dynamics

IN his clearly-written letter on this subject Mr. Tolver Preston seems to think that the reconciliation which he offers between Free Will and Necessity is a novel one. In this, however, he is mistaken, as the supposed reconciliation was very distinctly stated by the late Prof. Clifford in his lecture at St. George's Hall on "Body and Mind." But of more importance than the novelty of the reconciliation is the question as to its validity, and it is on this question that I shall make a few remarks.

The suggested reconciliation is as follows:—No upholder of Free Will can desire to maintain that a man may act, or desire and will to act, otherwise than in conformity with his character; for to maintain this would be to maintain that a man may act at random, without reference to any fixed principles of action, and that the Will is free only in the sense of being erratic. But if it is admitted that by freedom of the Will is meant freedom to choose within the lines laid down by previous character, and freedom, therefore, to shape future character by present volitions, it follows that upholders of the Free Will doctrine ought not to quarrel with those who uphold the doctrine of Necessity as due to "brain dynamics"; for the latter doctrine supplies the very basis which the former doctrine requires. It shows why the Will always acts in accordance with previous character; it shows that the Will can never be free in the sense of being lawless, or not determined by adequate causes; and it shows that the Will must be free in the sense of being able to choose between motives supplied by the structure of pre-formed character. Thus, it is represented, believers in Free Will ought to welcome modern physiology with all its "materialistic" deductions from "brain dynamics" to mental changes. For, unless these persons desire to land themselves in that quagmire of hopeless nonsense—the conclusion that volitions are uncaused—they have no alternative but to conclude that volitions are determined by motives, which are themselves determined by previous character. But if once volitions are thus conceded to enter the stream of causation, the more rigid the causation, the better for such freedom as remains, seeing that the latter, if always strictly determined, can never be lawless or erratic. Now of all things rigid, that which is least open to any suspicion of laxity is physical causation. Consequently, if the Determinism of Psychology admits of being resolved into the Necessity of Physiology, believers in the Freedom of the Will ought to rest peacefully satisfied that while they are free to act within the limits prescribed by their own characters, they have the sure and certain guarantee of physical causation that their volitions can never break out into activity at random. Or, as Mr. Tolver Preston puts it: "Solely in virtue of the fact that there is strict Causal Sequence in nature are the actions brought into strict conformity with individual brain structures (or with character). If the principles of dynamics were not rigid, or if the laws of nature were liable to alteration, a man's actions might sometimes be in harmony with his brain structure [character], sometimes in discord with it; or any number of persons, though possessing totally different brain-structures [characters], might act identically. The questionable expediency of the proceedings of those who are disposed to grumble at what they term the 'iron' laws of nature becomes apparent here."

Such, I think, is a full statement of the suggested reconciliation. I shall now proceed to show that as a reconciliation it is utterly futile.

There is nothing to be said against the reasoning as far as it goes; but it is curious, if not unsatisfactory, that both Prof. Clifford and Mr. Preston should have performed their little play without letting us know that the Prince of Denmark has been omitted. His name in this case is Responsibility. No doubt it is perfectly true that the suggested reconciliation shows to all believers in Free Will that their belief ought only to include freedom "as freedom to act in accordance with" character;